REMARKS

The Amendments

Support in amended claim 1 for the 100-100° range of the angle between the respective center axes of the silica matrix and the flame of reactant gas is found in Examples 1 and 2 of the specification wherein the angle is 110° and 100° respectively, thus, supporting both ends of the range. See also Figure 1, page 4, lines 30-37, and page 8, lines 16-20, each discussing the feature of the angle of the burner axis and its need to be at more than 90° to achieve the stated desired result of applying to a wider surface area of the forming matrix. Support for new claim 18 is found in Figure 1 and at page 8, lines 8-20, for example. It is clear from the figure that the flame of reactant gas is directed at the tip of the forming cylindrical porous silica matrix.

To the extent that the amendments avoid the prior art or for other reasons related to patentability, competitors are warned that the amendments are not intended to and do not limit the scope of equivalents which may be asserted on subject matter outside the literal scope of any patented claims but not anticipated or rendered obvious by the prior art or otherwise unpatentable to applicants. Applicants reserve the right to file one or more continuing and/or divisional applications directed to any subject matter disclosed in the application which has been canceled by any of the above amendments.

The Rejections under 35 U.S.C. §103

The rejection of claims 1, 2 and 7–11, 15 and 16 as being obvious over U.S. Patent No. 6,319,634 (Berkey) in view of U.S. Patent No. 5,210,816 (Iino) and/or U.S. Patent No. 6,263,706 (Deliso), and in further view of US Patent No. 6,333,284 (Otsuka) and the

rejection of claims 3, 12 and 13 as being obvious over these references further in view of US Patent No. 6,653,024 (Shiraishi) are respectfully traversed.

Initially, applicants have the following comments regarding the meaning of the instant claims in response to the comments in the Advisory Action dated September 22, 2005. It may be true that a hollow silica matrix, such as prepared by Berkey or other OVD processes, would fall within the definition of the term "cylindrical" due to its outermost shape. But it would not fall within the meaning of a "cylindrical porous silica matrix .. with a uniform density," as recited in the instant claims. A hollow cylinder or a cylinder formed around some other mandrel material obviously cannot have uniform density through its whole cross section because the middle of it is some other material or absence of material. The comparison of Fig. 8 of Berkey and Fig. 1 of the instant specification made in the Advisory Action does not show that applicants' matrix is of the same type of cylinder as Berkey's matrix. In Berkey's Fig. 8, the matrix 32 clearly forms around the mandrel 42 and the mandrel is contained in the center of the cylinder throughout the extent of the matrix. In contrast, the rotatable substrate shown in applicants' Fig. 1 does not extend through the center of the matrix. The figure shows the extension of the axis thereof by the dotted line but not the extension of the substrate itself. Further, the fact that the disclosure and the claims recite that the resulting matrix is of uniform density throughout would make clear that an OVD process with a mandrel running the length of the center of the matrix must be excluded. In view of Fig. 1 and the uniform density requirement, it would be evident to one of ordinary skill in the art that the cylindrical porous silica matrix must be a homogeneous solid cylinder. Reading the claims in view of the disclosure as a whole, including in context of Fig. 1 and the uniform density requirement, this is the only (and the broadest) "reasonable" interpretation. The person of ordinary skill in the art is deemed to read the claim term not only in the context

of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification, i.e., the "ordinary meaning" is viewed in light of the disclosure, not in a vacuum; see Phillips v. AWH Corp. et al., 415 F.3d 1303, 75 USPQ2d 1321 (Fed. Cir. 2005) *(en banc)*, whose *en banc* status makes it controlling over, for example, the Chef America decision cited in the Advisory Action. See also, Vitronics Corp. v. Conceptronic Inc., 90 F.3d 1576, 39 USPQ2d 1573, 1577 (Fed. Cir. 1996).

Berkey's method is an OVD (Outside Vapor Deposition) method. As previously discussed and referred to above, in such a process a porous silica matrix is formed around a substrate (i.e., a mandrel) and then the substrate or mandrel is removed. The resulting formed glass matrix is in a tubular shape, i.e., a tube of the glass matrix with the mandrel of some other material in the middle. Figure 8 of Berkey makes clear that an OVD process is used wherein element 42 is the mandrel. See also col. 6, lines 4-6, of Berkey disclosing formation of the glass "around support member 42." Thus, it is clear that Berkey teaches forming a glass silica matrix in a hollow tubular shape. See also Figs. 3-6 of Berkey and col. 4, lines 31-52. Therein, it is disclosed that the resulting tubular glass is cut, sliced and opened up by applying a force while heating. Much of Berkey's disclosure, in fact, relates to methods for separating and flattening out the resulting hollow glass tube of their OVD production method.

As such, Berkey fails to teach or suggest a method for making a "cylindrical" porous silica matrix of "uniform density." And, particularly, Berkey fails to teach or suggest a silica matrix having a density of 0.1 – 1.0 g/cm^3 with its distribution within 0.1 g/cm^3. Berkey's OVD method obviously results in a hollow tube of silica/glass matrix. While a hollow tube has a cylindrical outer shape, it should be evident that it is not a "cylindrical" porous matrix having a uniform density. A hollow tube or a cylindrical matrix surrounding a mandrel of some other material (e.g., an alumina mandrel used in Berkey) obviously does not have a

uniform density, i.e., the density of the air in the hollow part or the alumina mandrel is clearly not uniform with the density of the porous matrix material.

Berkey also fails to disclose or suggest a method wherein "the silica matrix and the flame of reactant gas from the single burner are oriented to define an angle of 100° – 110° between their respective center axes." Compare instant claim 1. In Berkey's process as shown in Fig. 8, the reactant gas is directed onto the mandrel and forming matrix at a 90° angle to the forming matrix axis. See also, col. 6, lines 22-26, confirming that the soot source is directed "normal" (= 90°) to the axis of the support member mandrel.

Finally, regarding new claim 18, Berkey fails to disclose or suggest a method wherein "the flame of reactant gas is directed at the tip of the forming cylindrical porous silica matrix." Again, Fig. 8 of Berkey shows that the reactant gas is directed at the center of the mandrel – and, thus, the center of the forming matrix. While relative motion is provided to deposit the matrix over the length of the mandrel, Fig. 8 shows that it is never extended to the tip.

None of Iino, Deliso, Otsuka and/or Shiraishi provides teachings which would suggest applicants' invention or modification of Berkey to arrive at or suggest applicants' invention. Iino provides an opposite teaching from Berkey and is not combinable therewith. Iino advocates achieving a higher soot density at the outer circumferential portion of the core as compared to the center portion. This is in marked contrast to an OVD process as disclosed by Berkey which provides a soot having a lower density at the outer surface than at the center portion. Consequently, these references teach away from each other and neither suggests a method for preparing a cylindrical silica matrix with a uniform density according to the instant claims, particularly with a density distribution within 0.1 g/cm^3. Deliso is similar to Berkey in disclosing that the preferred method of forming the soot preform is the OVD

method (see, e.g., col. 7, lines 15–18 and FIG. 1). As such, it has the same distinctions of Berkey discussed above. Also, Deliso only insinuates that the amount of fluorine added during doping can be constant across the preform, assuming a constant soot density. See, e.g., col. 4, lines 55–60. However, Deliso does not actually teach or suggest a soot with constant density nor does it teach or suggest a method according to the instant claims for achieving such. Rather, Deliso teaches that by picking a dopant from different compounds and controlling dopant parameters, such as doping times, one can control the concentration of dopant in the preform; see, e.g., cols. 4–6. Consequently, even if Deliso is combinable with Berkey and/or Iino, their combined teachings fail to teach or suggest a method for making a cylindrical silica matrix having a uniform density. Otsuka and Shiraishi were applied regarding certain dependent claim recitations and also provide no teachings to make up for the above-discussed deficiencies of Berkey.

For all of the above reasons, it is urged that the combined teachings of the cited prior art, taken as a whole, fail to suggest the claimed invention to one of ordinary skill in the art. Thus, a prima facie case of obviousness is not established and both of the rejections under 35 U.S.C. §103 should be withdrawn at least on this basis.

The significant advantageous properties of the products prepared by the claimed method provide further proof of the nonobviousness of the invention. The ability to prepare a material of uniform density – according to the claimed method which is not suggested by Berkey – is of significant advantage. Applicants have discovered that non-uniformity in density of the glass matrix can create non-uniformity in a deposited material, e.g., fluorine, which in turn can result in an undesired variance in transmittance of the material. See, e.g., the present specification at page 7, lines 22–34. Berkey fails to teach or suggest obtaining a constant density matrix to control the concentration of dopants. Rather, Berkey discloses

using different types of dopants (e.g., col. 7, lines 31–43) and controlling other parameters while, e.g., doping during formation of the soot matrix (e.g., col. 8, lines 20–34). Because the doping rate of fluorine varies with the matrix density, the concentration of the fluorine atoms doped is partially graded in a matrix having a density distribution. See, e.g., column 8, lines 4 - 34. Consequently, Berkey fails to lead one of ordinary skill in the art to the claimed invention or its advantages.

In the office action, it is asserted that Berkey proves a homogenous transmission of -2% to +2% at column 13, line 55, and that one of ordinary skill in the art would conclude that the distribution of fluorine concentration should be constant and cites examples 1 - 4 of Berkey to teach a uniform concentration of fluorine. That Berkey may allege a uniform fluorine distribution (note, however, that examples 2 and 4 of Berkey disclose tubes having a fluorine concentration "slightly less uniform" distribution and Figs. 16 and 19 do not appear to show uniformity) is of no consequence to the reasons discussed above for the failure of Berkey to suggest applicants' claimed method. If Berkey does achieve a uniform density, it is by a different method than the claimed method. Berkey's OVD method never results in a solid cylindrical glass matrix of uniform density.

Applicants' invention also provides an improvement over the conventional VAD method. The conventional method is disclosed, for example, in U.S. Patent No. 4,367,085 to Suto, which is of record herein. In such method the reactant gas was provided at an angle of 120-170° to the growing silica matrix axis (i.e., the θ angle of 10-60° in Fig. 6 corresponds to 120-170°). Applicants surprisingly discovered that an angle of 100-110° provides a more advantageous result. This is demonstrated by comparing Examples 1 and 2 with Comparative Example 1 in the instant disclosure. See, e.g., pages 11-14 and the summary in

Table 1 showing the advantageously more uniform properties of the products prepared according to the instant claims.

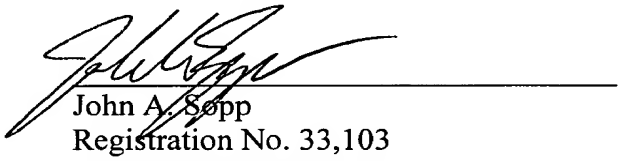
Applicants respectfully urge that, even if the cited prior art established a prima facie case of obviousness, the above discussed unexpected advantageous uniform properties of the products prepared by the claimed invention, prove nonobviousness of the claimed invention. This provides a separate and independent basis for patentability.

For all of the above reasons, applicants respectfully submit that both of the rejections of the claims under 35 U.S.C. §103 over Berkey in view of Iino and/or Deliso, and in further view of Otsuka, should be withdrawn.

It is submitted that the claims are in condition for allowance. However, the Examiner is kindly invited to contact the undersigned to discuss any unresolved matters.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,



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